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DEPENDENCY RATIOS: CONVENTIONAL AND REAL

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ABSTRACT

The conventional notion of dependency is refined and a concept of "real dependency" proposed.

Introduction

In any introductory course on population, it is common to start with many concepts that form the basic foundation of demographic analysis. One such concept is the dependency ratio and its components. It is high time that we critically looked at this concept in view of the changing social, and economic conditions. An attempt is made here to evaluate this concept and see the extent to which the conventional measure satisfies, or fails to satisfy what is expected of it.

Conventional Definition of Dependency Ratios/Rates

Following Petersen (1975), the dependency ratio is defined with the help of three demographic quantities, viz. dependent children (14 years and under), dependent aged (65 years and over) and active population (15-64 years). We have then:

a) $$\text{Child dependency rate} = \frac{\left[\begin{array}{l}\text{Dependent children} \\ \text{aged} < 14\end{array}\right]}{\text{Population (15-64)}} \quad 100$$

b)

$$\text{Old age dependency rate} = \frac{\left[\text{Dependent aged (i.e. 65 years and over)}\right]}{\text{Population (15-64)}} 100$$

c) Total dependency rate (or ratio) = (a) + (b)

$$= \frac{\left[\text{(Children} \leq \text{14 years) + those aged (65 years and over)}\right]}{\text{Population (15-64)}} 100$$

Petersen notes:

> To define the category 15-64 as the society's producers means, therefore, for Western countries we are in effect estimating the labor potential, the figure to which the labor force might expand in a period of national emergency." (p. 76)

Petersen also notes many difficulties in delimiting "active adulthood" by using the chronological age criterion. The definition of active population as those in the age span 15-64, even though conforms to statistical and legal conventions, may "over state the actual size of the active population in a typical Western country."

Weeks (1989, p. 221) simply states that the dependency ratio is "the ratio of the dependent-age population (the young and the old) to the working-age population" without really stating what constitutes the working age population. In the glossary (p. 498), Weeks brings in the age criterion. Accordingly, dependency ratio becomes "the ratio of people of dependent age (10-14 and 65+) to people of economically active ages (15-64)".

Health and Welfare Canada (1989) has devised another form of dependency ratio. "Dividing the population by the labour force gives another dependency ratio: the number of people that each member of the labour force supports including oneself" (Charting

Canada's Future, p. 26). Even this definition does not spell out what constitutes the labour force. If all people in the age group 15-64 is taken to constitute the labour force, then the supply side alone is considered. From the perspective of production of goods and services, the number of the actual economically active members of the population is bound to be much less than the supply side of the labour force.

There are many difficulties associated with the conventional definition of dependency ratio. While it is supposed to portray the economic burden placed on the active population, it simply cannot do that unless the "active population" is properly defined.

Active Population - Conventional and Modified Definitions

The conventional definition of active population is all persons in the age group (15-64), whether they all work and contribute to the production of goods and services or not. This is not satisfactory for many reasons. Persons in the age bracket 15 through 18 may not be working at all, or working part time (i.e., several hours per week). Some persons in the 15-64 age bracket may be unemployed. So their contribution to the production side of the economy is nil. They are all consumers. But that is a different matter. Also some who are older (65 years and above) work full time or part time. Confounding all these is the breakdown of the population by gender. The pursuit of active economic activity is not similar among males and females. Not all females in the age group 15-64 work, or can

find work. Childbearing and rearing takes some women out of economic activites for some time. In view of all these, the conventional definition of active population as those in 15-64 age group is unrealistic. As suggested by Petersen, the conventional "active population" may act as an upper limit to the actual active population in a country.

Two modifications of the conventional definition are suggested in the following sections. Some of these ideas have been developed earlier by the author and his associates (Krishnan et al., 1981, 1982).

Modified Defintion 1. -- Real Active Population and Real Dependency Rate.

Active population is the people who are actually involved in the production of goods and services irrespective of age and gender. These are the persons who work and hence exclude the unemployed.

The total "real active population" will then consist of 'the real active males' and 'the real active females'. Dependency rates computed with the real active population as the risk population will be called 'real dependency rates'.

Modified definition 2. -- The Most Real Dependency Rate

The modification given in the earlier section is straightforward. But the incidence of part time and over time workers makes the situation a bit complex. Their respective contribution to the economy has to be considered according to the time they put in. We have to think in terms of the number of hours worked per week to take care of this dimension. Ordinarily forty hours per week is taken as the time put in by a full time

employee. The number of hours worked by a full time worker can be fixed for a population, if appropriate data are available and the economic conditions demand the same. On this basis, we can work out the full time equivalents of part time and over time workers. Then one can redefine the "active population" as those comprising the "full time workers" and "the full time equivalents of part time and over time workers".

In the absence of detailed information, modification 2. cannot be realised. One may have to be satisfied with the first modified definition.

Canadian Dependency Rates

In this section, dependency rates for Canada are computed for 1976, 1981, and 1986 from the census data.

In Table 1, dependency rates based on the conventional definition are presented. We shall look at the dependency rates for the population as a whole. During 1976-86, the total dependency decreased from 52.3 to 47.0 per 100. While the youth dependency decreased from 39.1 to 31.3 (some 8 points), the old age dependency increased from 13.3 to 15.7 (an increase of 2.4 points) leading to a net decrease of 5.3 points in total dependency. We can compute these rates for the male and female components of the population. They indicate similar results.

Now let us look at Table 2 where the dependency rates are shown with reference to the employed persons only. In 1976, the total dependency was 83.8 per 100 compared to 52.3 per 100 by the conventional approach. The difference of nearly 30 points is

TABLE 1

Conventional Dependency* Rates, Canada

	Dependency Rate Per 100		
	Youth	Old Age	Total
1976	39.1 (39.0)	13.3 (13.3)	52.3 (52.3)
1981	33.2 (33.2)	14.3 (14.3)	47.5 (47.5)
1986	31.3 (31.3)	15.7 (15.7)	47.0 (47.0)

[Note: Figures in parentheses are for Canada excluding the Territories].

* Youth dependency rate is: $\frac{[\text{Pop} \leq 14 \text{ years of age}]}{\text{Pop aged (15-64)}} \times 100$

Old age dependency rate: $\frac{[\text{Pop aged (65 years and older)}]}{\text{Pop aged (15-64)}} \times 100$

Total dependency: Youth dependency + Old Age dependency

Source: Computed from the census data.

TABLE 2

Real Dependency Rates computed from Labour Force Survey Data, Canada

	Youth	Old Age	Total
1976	62.5	21.3	83.8
1981	50.8	21.9	72.7
1986	46.9	23.5	70.4

Note: In the Labour Force Surveys, the Territories are not covered. The rates then exclude the Territories.

mostly created by employing an incorrect risk population for computing the rate. In fact, the real burden of support on the shoulders of the employed (whether working full time, part time, or over time) is reflected in the modified rate. This is the real dependency rate. The total real dependency decreased from 83.8 in 1976 to 70.4 per 100. The decrease of 13.4 points is accounted for by a 15.6 point decline in real child/youth dependency and an increase of 2.2 points in real old age dependency.

In the appendix, the real and the conventional dependency rates are shown for the various provinces in Canada. We get the same picture for the provinces as well. The total dependency has declined as a result of a decrease in youth dependency, even though the old age dependency has increased slightly. The decline in fertility has led to a decrease in youth and an increase in old age dependency. Both measures of dependency reveal the same picture.

The provinces in Canada can be stratified on the basis of the real (or conventional) dependency. The Atlantic region exhibits the highest dependency, followed by the Prairies (excluding Alberta). Alberta and B.C. can be clubbed together. So also Quebec and Ontario. Of course, one can easily see that the dependency index is a complex of economic and socio-demographic conditions.

Concluding Remarks

The conventional dependency rates do not bring out clearly the actual burden placed on the real active population. In societies, where social programs are available, the tax burden falls on the employed. To portray the burden, using "consumers", or the members of the 15-64 age group as the risk population is inappropriate. The conventional measures are easy to calculate and the census figures can be put to use straight away. When data are available from labour force or other surveys, the real dependency rates should be preferred to the conventional ones.

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APPENDIX I

Total Dependency Rates, Real and Conventional, Canada and Provinces

	1976		1981		1986	
Provinces	Real	Conven	Real	Conven	Real	Conven
Newfoundland	142	67	113	59	109	53
P.E.I.	106	65	94	59	87	56
Nova Scotia	105	58	90	52	86	50
New Brunswick	110	60	95	54	90	51
Quebec	83	48	74	44	70	44
Ontario	78	52	67	47	64	46
Manitoba	89	57	80	54	77	53
Saskatchewan	94	61	85	58	85	59
Alberta	80	54	66	46	67	47
B.C.	82	51	72	47	75	48
Canada (Excluding the Territories)	84	52	73	48	70	47

Source: Computed from Labour Force Survey and Census Data.

Appendix II

Youth Dependency, Real and Conventional, Canada and Provinces

Provinces	1976		1981		1986	
	Real	Conven	Real	Conven	Real	Conven
Newfoundland	119	56	89	47	81	40
P.E.I.	76	46	63	39	56	36
Nova Scotia	77	43	61	36	55	32
New Brunswick	83	46	67	38	61	34
Quebec	63	37	53	31	47	30
Ontario	57	38	46	32	42	30
Manitoba	63	41	53	36	49	34
Saskatchewan	66	43	57	39	56	39
Alberta	63	42	50	35	50	35
B.C.	58	37	48	32	47	30
Canada (Excluding the Territories)	62	39	51	33	47	31

Source: Computed from Labour Force Survey and Census Data.

APPENDIX III

Old Age Dependency, Real and Conventional, Canada and Province

Provinces	1976		1981		1986	
	Real	Conven	Real	Conven	Real	Conven
Newfoundland	23	11	23	12	28	13
P.E.I.	30	18	31	19	31	20
Nova Scotia	28	15	28	17	31	18
New Brunswick	26	14	27	16	29	17
Quebec	20	11	21	13	23	14
Ontario	20	14	21	15	22	16
Manitoba	25	16	27	18	28	19
Saskatchewan	27	18	28	19	29	20
Alberta	17	12	15	11	17	12
B.C.	24	15	24	16	28	18
Canada (Excluding the Territories)	21	13	22	14	24	16

Sources: Computed from Labour Force Survey and Census Data.